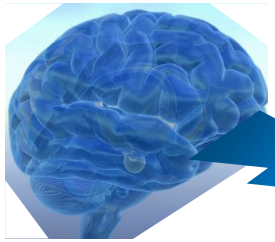

Executive Functions: Definitions, Assessment, and Education/Intervention

Presented by

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V. Trans-self Integration

Sense of source, Cosmic consciousness

IV. Self Generation

Mind-Body Integration, Sense of Spirit

III. Self Control:

Self Realization

- Self Awareness
- Self Analysis

Self Determination

- Goal Generation
- Long-Term Foresight/Planning

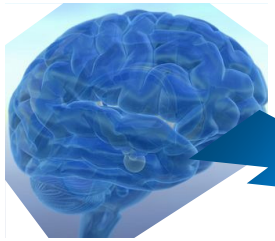
II. Self Control: Self Regulation

- Perceive
- Modulate
- Sustain
- Interrupt Stop
- Foresee Plan (Short-Term)
- Organize
- Balance
- Pace
- Time
- Monitor Check
- Focus Select
- Inhibit
- Hold
- Manipulate
- Shift Flexible
- Generate
- Store
- Associate
- Retrieve
- Execute (Behavior Syntax)
- Correct
- Initiate
- Gauge

Sensation/Perception Cognition Emotion Action

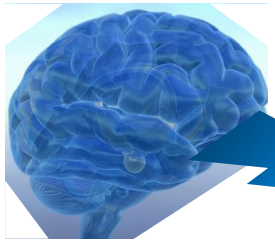
I. Self Control: Self Activation

Awaken, Attend



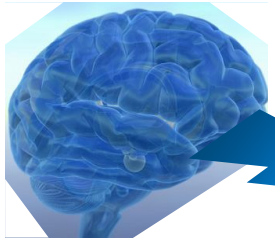
Executive Functions and School

- Although executive functions are used to guide cognitive processing involved in new learning, many new learning situations are structured in ways that reduce the need for strong executive direction.
- In contrast, demonstrating what has been learned usually requires significant involvement of executive control processes.



Executive Functions and School

- The more classroom instruction resembles tests of executive functions like the Wisconsin Card Sorting Test (figure out what we're learning, I'll tell you whether you are right or wrong), the more executive difficulties are going to impact classroom learning and performance.



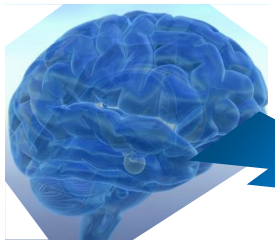
Executive Functions and School

- Test taking can be exceptionally difficult for a student with executive function difficulties if the test format emphasizes executive function demands over content knowledge.

A dark color

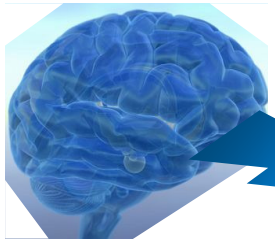
B R _ W _

B R O W N



Executive Functions and School

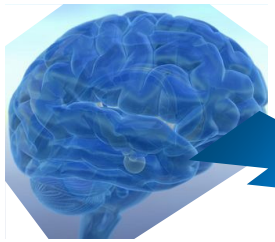
- In the classroom, the task most frequently impacted by executive function-driven producing difficulties is written expression.



Executive Functions and School

- What Evan wrote for me:

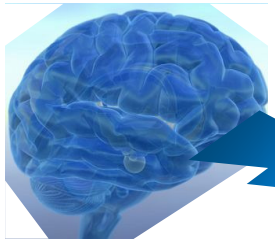
My favorite game is … "mabul roling it is fun. I like making the box to role in to. Iam prety gode as well. It is rell inters ing. It is so fun



Executive Functions and School

- What Evan told me:

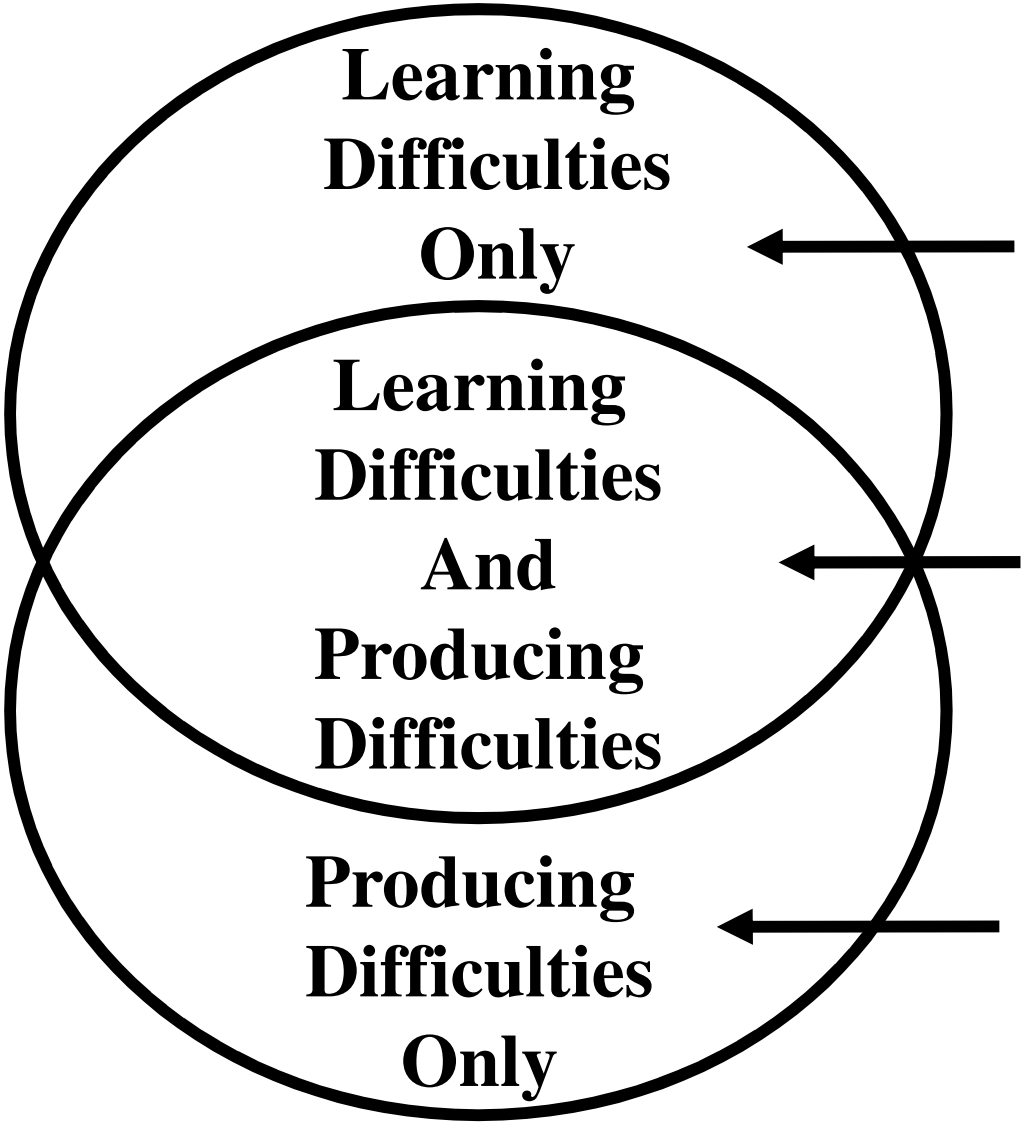
  "My favorite game is rolling marbles. I think it is fun. I just learned it yesterday. It can be pretty hard at times. It can be fun and it's interesting if you make it challenging. I like making the boxes to roll the marbles into. You probably need to be pretty skilled with eye hand coordination to do it. To get up the ramp you need to roll it really fast."



Executive Functions and School

- As Martha Denckla has pointed out, Executive Function difficulties of a severe nature (especially in the Symbol System Arena) do not result in Learning Disabilities; they result in "Producing Disabilities."

A General Model for Conceptualizing Learning and Producing Difficulties

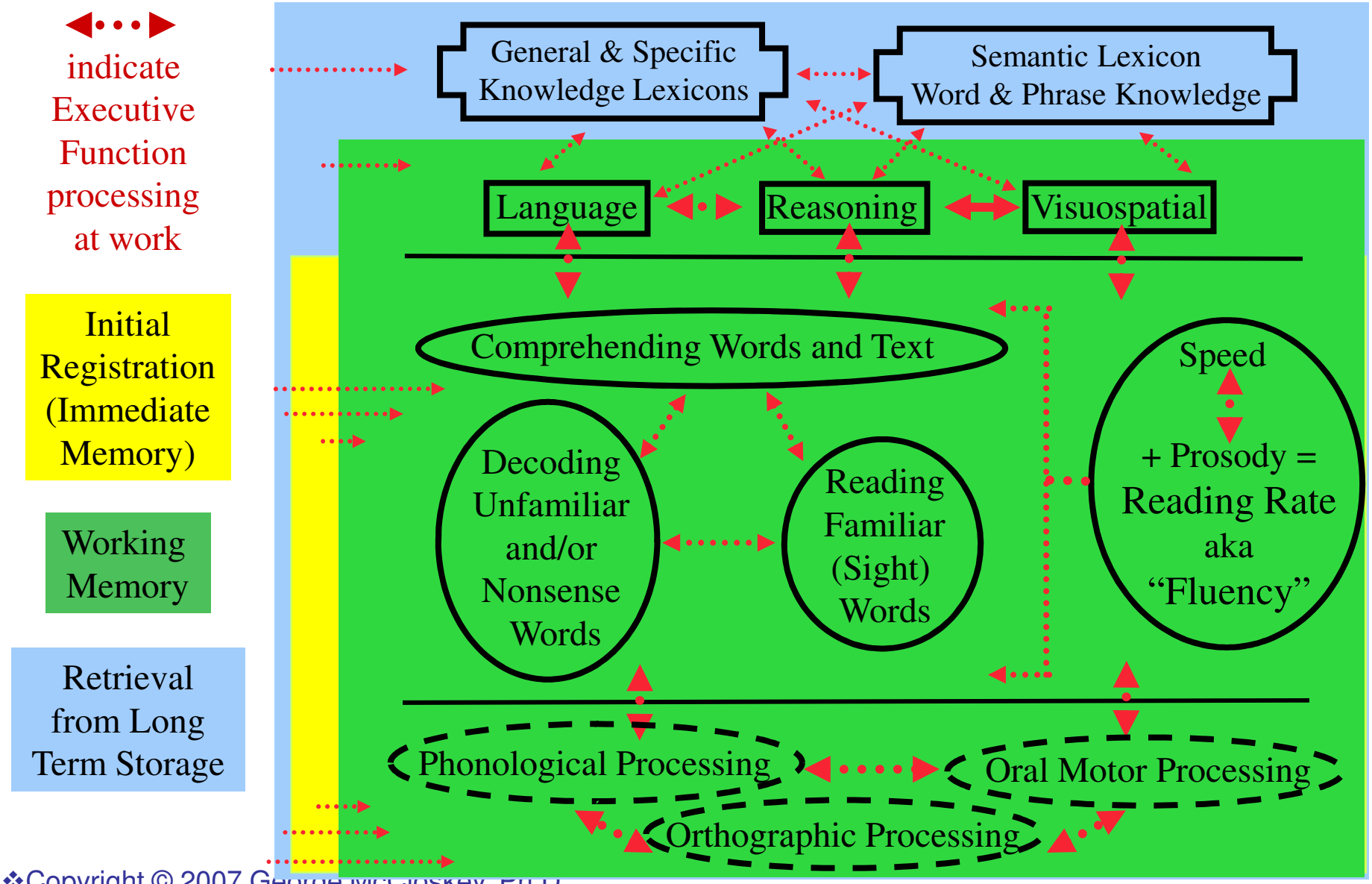


Often NOT recognized as a Learning Disability, even when severe, unless an evaluation involving process assessment is done

Recognized fairly quickly as a Learning Disability

When severe, typically attributed to lack of motivation, character flaws, or behavior/personality problems

An Integrative Model Specifying Processes, Abilities, Lexicons, Skills, Memory and Achievement in Reading



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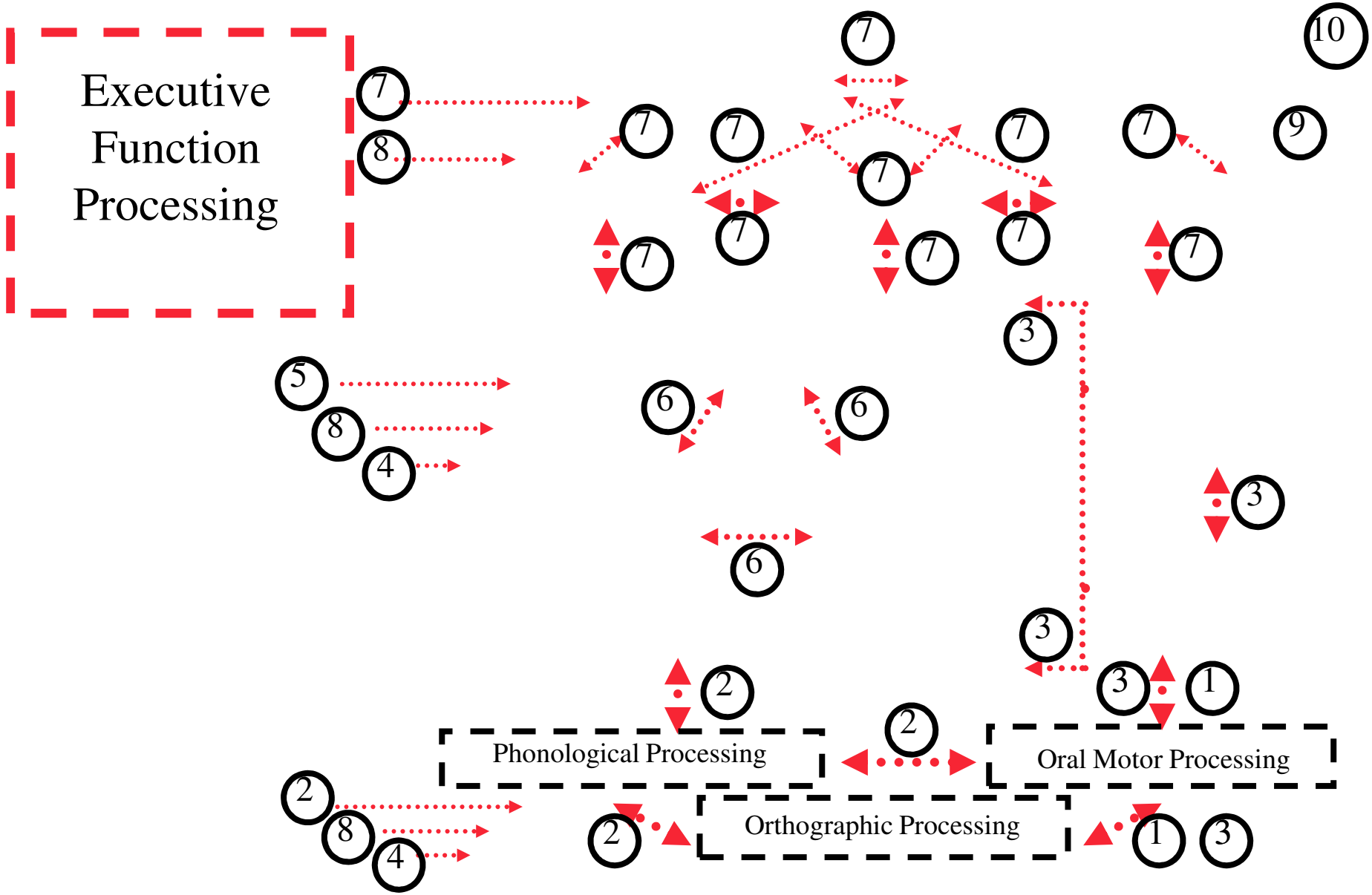
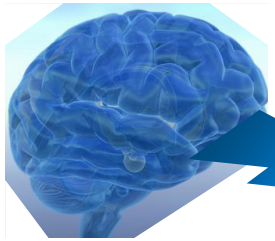
Executive Functions and Reading



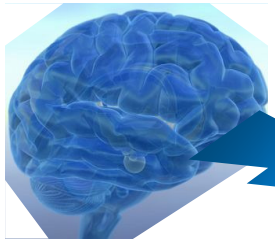


Executive Functions and Reading

① Cueing immediate and sustained attention to orthography for accurate letter/word perception and discrimination

② Cueing and coordinating the use of phonological and orthographic processes for accurate word pronunciation

③ Directing efficient oral motor production, prosody, and rate for reading words and connected text

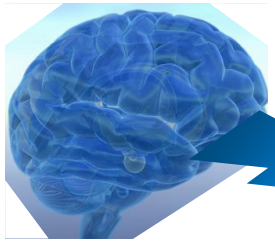


Executive Functions and Reading

④ Cueing and directing the use of attention and immediate memory resources for reading words and connected text

⑤ Cueing retrieval of information from various Lexicons to read words and connected text

⑥ Cueing and coordinating the use of word recognition, word decoding, and reading comprehension skills



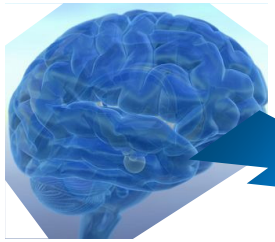
Executive Functions and Reading

⑦ Cueing and coordinating the use of abilities and the retrieval of knowledge from Lexicons to create meaning for text comprehension

⑧ Cueing and sustaining the use of working memory resources while reading words and constructing meaning from text

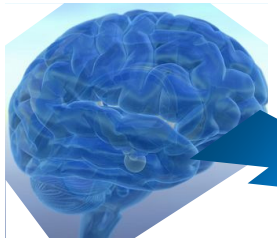
⑨ Cueing and directing the oral expression of meaning derived from text comprehension

⑩ Cueing and directing the use of strategies for reading words and deriving meaning from text



Executive Functions and Reading

Alana, an 11 year-old child displays adequate word reading skills when reading word lists and adequate RAN performance with letters and words. However, when asked to read a short two sentence text orally, she experiences extreme difficulties with applying both word reading and rapid naming skills; words are skipped, misread, and reread; highly familiar words are decoded instead of sight read, less familiar words are decoded at an extremely slow pace; word misreadings are left uncorrected despite the disconnect between the orally read word and the meaning of the text (e.g., reading “bornes” for “bones”). Despite superior ability to reason with verbal material, Amanda is unable to offer adequate responses to questions about what she just read, even after taking time to reread the sentences silently.



Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Word Reading task:

  "Look at this page…read these words as quickly as you can without making any mistakes."

green blue green red green

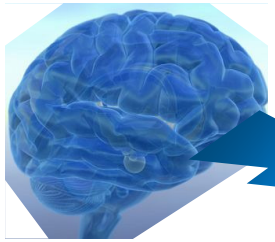
green red blue green blue red blue green blue green

red green blue green blue green red blue red green

red green blue green red blue green red blue red

blue green red blue green red blue green blue red

green red blue red blue green red blue red green



Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Inhibition task:

  "Look at this page…the color names are printed in a different colored ink. You are to name the color of the ink that the letters are printed in not read the word."

Rule:
Name the ink color.

red blue green blue green

red blue red green red

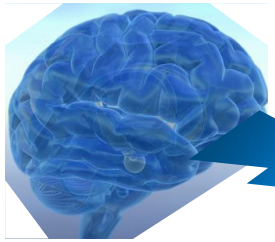
blue green blue red blue red blue red blue red

blue green blue green red green blue red blue green

red green red blue green red green red blue green

blue green blue red green blue red green red green

green blue red blue green red blue green red blue



Assessing Executive Functions Related to Reading

- Example of D-KEFS Color-Word Interference Inhibition-Switching task:

  "This time, for many of the words you are to name the color of the ink and not read the words. But if a word is inside a little box, you should read the word and not name the ink color."

Rules:

1. blue – Name the ink color.
2. red – Read the word.

blue red green red blue

green red green red blue

green blue green blue red green red green red blue

red blue red green blue green blue red red blue

blue red green red red green blue red blue red

blue green blue green red red green red blue green

green red red blue green blue red green green red

Rule:
Name the ink color.

red blue green blue green

red blue red green red

blue green blue red blue red blue red blue red

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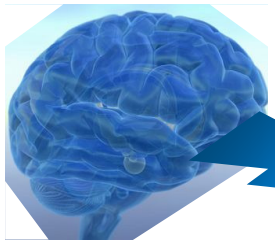
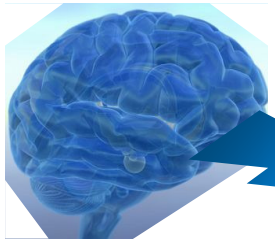


Self-Regulatory EFs

- Play a critical role in day-to-day functioning in all arenas and domains of functioning
- Increasing awareness of how many are needed:
  - ADHD literature has increasingly expanded on the definition of EF difficulties
  - BRIEF identifies 8 EF SR capacities



EF Self-Regulation Skills

- EF Self-regulation skills eventually need to be just that—Self-regulated.
- During classroom instruction, it is necessary to find the balance between providing enough EF SR cueing to help students function, but not too much to prevent EF skill-development. Issue of internal versus external prompting.
- It is easy to underestimate the multiplicity of EF SR skills and focus on issues related to attention and organization.

EF Self Regulation Prompts

- Different types of Aural prompts:
  - Auditorily presented verbal (oral language)
  - Visually presented verbal (written Language)
  - Auditorily presented nonverbal (nonlanguage sounds, such as whistling, making sounds, etc.)

EF Self Regulation Prompts

- Different types Visual of prompts:
  - Visually presented nonverbal symbols (diagrams, etc.)
  - Visually presented nonverbal manual (hand gestures, body movements, etc.)
  - Tactilely presented nonverbal (shoulder tapping, etc.)

Perceive

- The Perceive function cues the use of sensory and perception processes to take information in from the external environment or “inner awareness” to tune into perceptions, emotions, thoughts, or actions as they are occurring.
- Prompt examples: “Listen to this.” “Look up at the board.”

  “How are you feeling right now?”

Initiate

- The Initiate function cues the initial engagement of perceiving, feeling, thinking, or acting .
- Prompt example: “Start walking now.” “Begin work on the count of five.”

Modulate

- The Modulate function cues the regulation of the amount and intensity of mental energy invested in perceiving, feeling, thinking, and acting.
- Prompt example: "Let's all use our indoor voices now."

  "Please tone it down a bit."

Gauge

- The Gauge function cues one to identify the demands (perceptual, emotional, mental, physical) of a task or situation and cues the activation of the resources needed to effectively engage the task or situation.
- Prompt example: “Consider what it’s going to take to get this job done right.”

Focus/Select

- The Focus/Select function cues the direction of attention to the most relevant specifics of a given environment, situation, or content while downgrading or ignoring the less relevant elements.
- Prompt example: “Pay attention to what happens to the baking soda after the vinegar is added.”

Sustain

- The Sustain function cues sustained engagement of the processes involved in perceiving, feeling, thinking, or acting.
- Prompt example: “You will need to watch the computer screen carefully for the entire 10 minutes.”

Stop/Interrupt

- The Stop/Interrupt function cues the sudden, immediate discontinuation of perceiving, feeling, thinking, or acting.
- The Stop/Interrupt cue always precedes the Shift/Flexible cue when altering problem-solving based on changing conditions, and switching or alternating attention.
- Prompt example: “Stop writing now.”

Flexible/Shift

- The Flexible/Shift function cues a change of focus or alteration of perceptions, emotions, thoughts or actions in reaction to what is occurring in the internal or external environments.
- Prompt example: “Mrs. Smith isn’t here today, so we won’t be able to practice in her room.”

Inhibit

- The Inhibit function cues resistance to, or suppression of, urges to perceive, feel, think, or act on first impulse.
- Prompts direct capacities to an alternate source rather than drawing attention to the perception, emotion, thought, or action that should be inhibited.
- Prompt example: “Listen to what Jane is saying.” [Instead of the conversation that is taking place outside the open window].

Hold

- The Hold function cues activation of the necessary cognitive processes required to maintain information in working memory and continues cueing these processes until the information is manipulated, stored, or acted on as desired.
- Prompt example: “Hold that thought while we hear a reaction from the other group.”

Manipulate

- The Manipulate function cues the use of working memory and other cognitive processes for the manipulation of perceptions, feelings, thoughts or actions as they are being held in mind or being accessed in the environment.
- Prompt example: “Visualize what it would look like if you turned it upside down.”

Foresee/Plan (Short-term)

- The Foresee/Plan function cues the anticipation of conditions or events in the very near future, such as the consequences of one's own actions, or cues the engagement of the capacities required to identify a series of perception, feelings, thoughts, and/or actions, and the likely or desired outcome that would result from carrying them out in the very near future.
- Prompt example: "If you keep erasing in that same spot, what do you think will happen to the paper?"

Organize

- The Organize function cues the use of routines for sorting, sequencing, or otherwise arranging perceptions, feelings, thoughts, and/or actions, to enhance or improve the efficiency of experience, learning, or performance.
- Prompt example: “Let’s establish the order in which you need to do things to get this task done.”

Associate

- The Associate function cues the realization that associations need to be made, and cues the activation of the resources needed to attempt to make the necessary associations.
- Prompt examples: "Have you heard anything like that before?"

  "This problem is very similar to one you worked on last week."

Generate

- The Generate function cues the realization that novel, fluid problem-solving efforts are required and cues the activation of the resources needed to carry out problem-solving routines.
- Prompt example: "We haven't tried to solve a problem like this one before."

  "This problem will require some novel thinking if you are going to find a solution."

Balance

- The Balance function cues the regulation of the trade-off between opposing processes or states (e.g., pattern vs detail; speed vs accuracy; humor vs seriousness) to enhance or improve experiencing, learning, or performing.
- Prompt example: “Work as quickly as you can, but be careful not to make any mistakes.”

Store

- The Store function cues the movement of information about perceptions, feelings, thoughts and actions from the mental processing environment of the present moment into “storage” for possible retrieval at a later time.
- Prompt example: “This is important; it will be on Friday’s quiz.”

Retrieve

- The Retrieve function cues the activation of cognitive processes responsible for finding and retrieving previously stored information about perceptions, feelings, thoughts and actions.
- The more specific the demands or constraints placed on the retrieval task, the greater the requirements for precision of retrieval cues.
- Prompt example: "To answer the question correctly, you will probably need to recall all that we learned about photosynthesis."

Pace

- The Pace function cues the awareness of, and the regulation of, the rate at which perceptions, emotions, cognitions, and actions are experienced or performed.
- Prompt example: “You will need to work quickly as there is not much time left.”

Time

- The Time function cues the monitoring of the passage of time or cues the use of time estimation routines.
- Prompt example: “Tell me how long this will take you to do.”

Execute

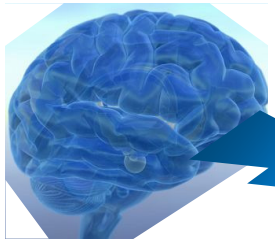
- The Execute function cues the orchestrating of the proper syntax of a series of perceptions, feelings, thoughts, and/or actions, especially in cases where automated routines are being accessed or are initially being developed.
- Prompt example: “Use the routine you learned to do these.”

Monitor

- The Monitor function cues the activation of appropriate routines for checking the accuracy of perceptions, emotions, thoughts or actions.
- Prompt example: “Periodically check the task directions to see if you are following all of them.”

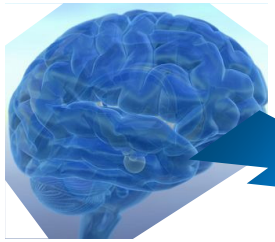
Correct

- The Correct function cues the use of appropriate routines for correcting errors of perception, emotion, thought, or action based on feedback from internal or external sources.
- Prompt example: “Correct any errors you find.”



Executive Function Assessment

- The most effective approach to the assessment of executive functions involve:
- Conducting a thorough semi-structured clinical interview
- Using additional data collection methods to test hypotheses generated from the clinical interview



Executive Function Assessment

- Clinical Interviews
- Performance on Standardized Tasks (Symbol System only)
- Behavior Ratings
- Behavior Observations
- Anecdotal Records
- Case History

Behavior Rating Scales

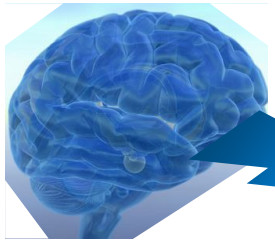
- Behavior Rating Inventory of Executive Functions (BRIEF)
- ADHD Scales (Assess a subset of self regulation EFs):
  - ADHD Rating Scale-IV
  - Brown ADD Scale
- Behavior Assessments
  - E.g., Specific Item Ratings on scales such as the BASC-II often reflect difficulties with specific EFs

Assessing the Use of EF Prompts in the Classroom

An Observation Form (McCloskey, Perkins & VanDivner) has been developed for use to help structure observations and assist in providing effective feedback to teachers.

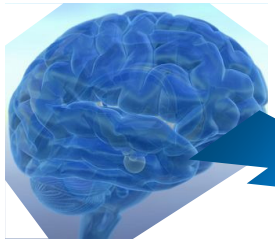
Executive Function Classroom Observation Form (EFCO)

- The form has two components
  - A definition and sample sheet to help you focus on the types of prompts that you are observing.
  - The observation form, that lists all 23 areas, has a space for taking notes and keeping track prompts that are observed.



Example Prompts

- The definitions & sample prompts are used to prepare for the observation
- For each self-regulation EF, examples of positive and specific prompts and negative, vague and/or poorly timed prompts are provided.

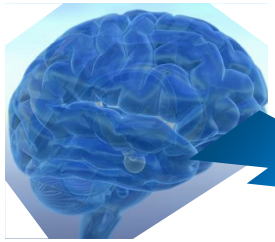


EFCO Example Prompts

- Each self-regulation EF has sample prompts for each of the four domains of function:
- P =Perceiving;
- F = Feeling;
- T = Thinking
- A = Acting

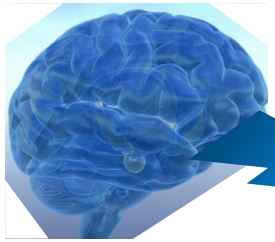
Strategies for Becoming Familiar with EF SRs and Prompts

- To effectively use the observation form, you will have to build familiarity with each of the 23 self-regulation areas.
- At first, this can seem overwhelming, but if you use your own EF's effectively, it can be accomplished!
- Break them down into chunks, perhaps study one a day. In less than a month, you will have them mastered.



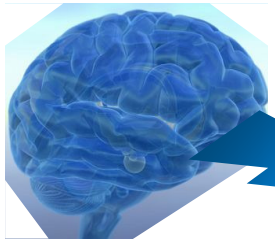
EF Implications for Classroom Instruction

- To assure that executive function capacities are used to their fullest potential, it is important to state the goals of the learning process. Stating goals enables executive capacities, either consciously or nonconsciously, to engage the perceptions, emotions, thoughts, and actions, needed to achieve the goals.



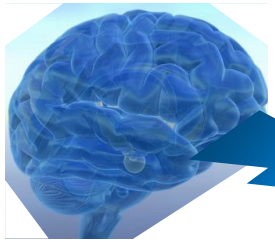
EF Implications for Classroom Instruction

- In preschool, kindergarten and early elementary years, in many ways, teachers ARE their student‘s frontal lobes.
- Providing executive prompts and cues are important to assure that children are engaged appropriately in the instructional process.
- Modeling good executive functions helps children see how they can self-regulate their own perceptions, emotions, thoughts and actions.



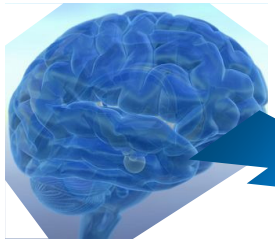
EF Implications for Classroom Instruction

- In late elementary, junior-senior high school, college, and even graduate school, effective teachers provide executive function prompts and model good executive function use.



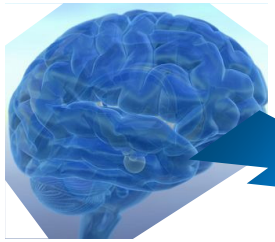
EF Implications for Classroom Instruction

- Providing students with feedback about their performance enables them to engage executive capacities more effectively to learn from their mistakes and improve future performance



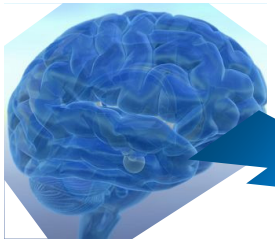
Using Rewards to Increase Production

- Rewards do not teach the child how to reflect on and alter the behavior, they simply reward the presence of the desired behavior.
- Reward programs imply that a child can do it if he/she wants to or is motivated enough to. This often leads away from the realization that many children who do want to change their behavior don't know what to do to change it.



EF Self-Regulation Skills

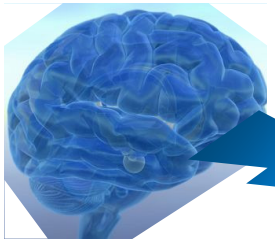
- EF Self-regulation skills eventually need to be just that—Self-regulated.
- During classroom instruction, it is necessary to find the balance between providing enough EF SR cueing to help students function, but not too much to prevent EF skill-development. Issue of internal versus external prompting.
- It is easy to underestimate the multiplicity of EF SR skills and focus on issues related to attention and organization.



Executive Function Difficulties

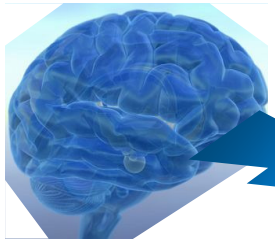
Are they the result of:

- Disuse through Conscious Choice
- Innate Deficiency
- Maturational Delay
- Disuse through Nonconscious Choice



Executive Function Difficulties

For intervention purposes, it is best to assume that EF deficiencies are the result of disuse through nonconscious choice. The primary intervention goal the becomes education to make the child conscious of the EFs needed and how to engage them.



Executive Function Intervention

Intervention efforts will vary along a continuum from imposing external control to encouraging internal self control

Strategies for Helping Students Develop Internal Control

- Increase student awareness of self-regulation expectations and goals for development
- Model appropriate use of self-regulation executive function capacities

Strategies for Helping Students Develop Internal Control

- Teach self-regulation capacities as specific skill routines
- Develop a common vocabulary and set of nonverbal symbols for describing or signifying self-regulation capacities and signaling their use

Strategies for Helping Students Develop Internal Control

- Model and encourage the use of internalized “self-talk” as a means of increasing awareness of executive functions and when and how to use them
- Model and teach the use of self-administered reward routines to increase the use of self-regulation efs

Strategies for Providing External Guidance

- Align external demands with internal desires to maximize motivation
- Provide predictable, consistent structure to the classroom environment and classroom routines

Strategies for Providing External Guidance

- Provide time management aids, such as calendars, clocks, timers, schedules, etc.
- Provide external prompts and cues as a substitute for self-regulation

Strategies for Providing External Guidance

- Provide immediate and frequent feedback about the effectiveness of attempts to engage self-regulation executive functions
- Use rewards, but heed the cautions mentioned earlier

Strategies for Improving Assessment Methods

- Offer bonus points for handing in homework and assignments on time instead of taking points away
- Point out minor errors and offer students a chance to correct them before assigning a grade

Strategies for Improving Assessment Methods

- Offer feedback and opportunities to revise writing assignments before grading them
- Offer students choices for ways to demonstrate content knowledge

Strategies for Improving Assessment Methods

- Offer credit for all efforts to correct work; offer opportunities to retake failed tests
- Deduct no more than 5-10% of total points for minor detail errors

Strategies for Improving Assessment Methods

- Offer multiple ways to participate in classroom activities, not just oral expression
- Use pop quizzes only as a diagnostic tool rather than a graded performance measure

Strategies for Improving Assessment Methods

- Offer response choices (word banks) for open-ended question formats
- Provide guidelines and progress checks for long-term projects

Strategies for Improving Assessment Methods

- Avoid placing constraints on response modes as much as possible
- Teach note-taking, memory strategies, and study skills when necessary